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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/790,296   | 03/01/2004  | Khoi A. Phan         | H1907 / AMDP986US   | 9254             |
| 23623  | 7590        | 06/16/2005           | EXAMINER            |                  |
| AMIN & TUROCY, LLP<br>1900 EAST 9TH STREET, NATIONAL CITY CENTER<br>24TH FLOOR,<br>CLEVELAND, OH 44114 |             |                      | DINH, PAUL          |                  |
|  |             |                      | ART UNIT            | PAPER NUMBER     |
|  |             |                      | 2825                |                  |

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                                      |                                    |  |
|------------------------------|--------------------------------------|------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/790,296 | <b>Applicant(s)</b><br>PHAN ET AL. |  |
|                              | <b>Examiner</b><br>Paul Dinh         | <b>Art Unit</b><br>2825            |  |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 15-33 is/are rejected.
- 7) ☒ Claim(s) 13,14 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

## DETAILED ACTION

### Claim Objection

Claim 3 is objected to because it is not clear as to how a (first) dimension is considered more important than another (second) dimension.

### *Claim Rejections - 35 USC § 112*

*The following is a quotation of the second paragraph of 35 U.S.C. 112:*

*The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.*

Claims 9, 24-5, 27-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 9 is rejected because “in situ” for this particular invention is not clearly defined in this claim. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims.

Claims 24-25, 27-28 are rejected because “the method of claim 21” and “the method of claim 25” lack antecedent basis

### *Claim Rejections - 35 USC § 102*

*The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:*

*A person shall be entitled to a patent unless –*

*(b) The invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.*

*(e) The invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.*

1. Claims 1-7, 9-11, 20-23, 25-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Chen et al (USP 6218200)

(Claims 1, 23, 33) an overlay target that represents overlay between three or more layers of a wafer (abstract, background, fig. 1, 4-6), and

A measurement component that determine overlay error (of/between non-adjacent layers of the wafer) existent in the overlay target, and thereby determines overlay error between the three or more layers of the wafer (abstract, background, fig. 1, 4-6).

(Claim 2) further comprising a control component that utilizes the overlay error determined by the measurement component to correct overlay error between the three or more layers of the wafer (abstract, background, fig. 1, 4-6).

(Claim 3) wherein the control component provides more correction in a first dimension and less correction in a second dimension in an instance that precision of overlay alignment is more important in the first dimension when compared to the second dimension (col 3-4, fig 1, 4-6).

(Claims 4-5) wherein a substantial/insubstantial overlay correction between non-adjacent layers of the wafer in a first dimension correlates to a substantial/insubstantial overlay correction between adjacent layers of the wafer in a second dimension (col 3-5, fig 1, 4-6).

(Claims 6-7, 26) wherein the control component manipulates at least one of temperature(s) associated with a process step, pressure(s) associated with a process step, concentration of gas (es) within a process step, concentration of chemical(s) within a process step, composition of gas (es) within a process step, composition of chemical(s) within a process step, flow rate of gas (es) within a process step, flow rate of chemical(s) within a process step, timing parameters associated with a process step, and excitation of voltages associated with a process step (fig 1-6, col 1-3), wherein at least one of concentration, rate of flow, and degree of abrasiveness is controlled to correct overlay error (fig 1-6, col 1-3).

(Claim 9) wherein the measurement component and the control component facilitate in situ (fig 1 in combination with other processes/hardware/software/steps, insofar the limitation is understood) correction of overlay error.

(Claims 10, 32) the control component facilitating simultaneous overlay correction of two or more wafers (fig 1, 4-6).

(Claim 11) wherein the overlay target has a structure of at least one of box-in-box, frame-in-frame, segmented frame, and periodic structure (abstract, background, fig 2-6).

(Claim 20) the overlay target associated with a particular die on the wafer (fig 1-6).

(Claim 21) the wafer subdivided into a grid (abstract, background, col 1-2, 4-5) comprising a plurality of cells, wherein the grid (abstract, background, col 1-2, 4-5) facilitates measurement and recordation of overlay error at particular portions of the wafer.

(Claim 22) the wafer discarded if a threshold percentage of cells exhibit a threshold level of overlay error (abstract, background, fig 1-6).

(Claim 25) correcting overlay error between non-adjacent layers of the wafer based at least in part on the measured overlay error existent in representative layers of the overlay target (abstract, background, fig. 1, 4-6).

(Claim 27) further comprising approximating overlay error between adjacent layers on a wafer via measuring overlay error between the representative layers of the overlay target (abstract, background, fig 1, 4-6).

(Claim 28) further comprising correcting overlay error between adjacent layers of a wafer based at least in part on the measured overlay error existent in representative layers of the overlay target (abstract, background, fig 1, 4-6).

(Claims 29-30) substantially/insubstantially correcting overlay error between non-adjacent layers of the wafer in a first dimension (abstract, col 3-4, fig 1, 4-6), and substantially/insubstantially correcting overlay error between adjacent layers of the wafer in a second dimension (abstract, col 3-4, fig 1, 4-6).

(Claim 31) further comprising providing a greater amount of overlay correction in one particular direction in comparison to a substantially perpendicular dimension (col 3-5).

2. Claims 1-7, 9-11, 19-20, 22-30, 32-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Knutrud (USP 6612159)

(Claims 1, 23, 33) an overlay target that represents overlay between three or more layers of a wafer (title, abstract, background, summary, col 6-9), and

A measurement component that determine overlay error (of/between non-adjacent layers of the wafer) existent in the overlay target, and thereby determines overlay error between the three or more layers of the wafer (title, abstract, background, summary, col 6-9)

(Claim 2) further comprising a control component that utilizes the overlay error determined by the measurement component to correct overlay error between the three or more layers of the wafer (abstract, background, summary, col 7-9)

(Claim 3) wherein the control component provides more correction in a first dimension and less correction in a second dimension in an instance that precision of overlay alignment is more important in the first dimension when compared to the second dimension (abstract, background, summary, col 6-9)

(Claims 4-5) wherein a substantial/insubstantial overlay correction between non-adjacent layers of the wafer in a first dimension correlates to a substantial/insubstantial overlay correction between adjacent layers of the wafer in a second dimension (abstract, background, summary, col 6-9)

(Claims 6-7, 26) wherein the control component manipulates at least one of temperature(s) associated with a process step, pressure(s) associated with a process step, concentration of gas (es) within a process step, concentration of chemical(s) within a process step, composition of gas (es) within a process step, composition of chemical(s) within a process step, flow rate of gas (es) within a process step, flow rate of chemical(s) within a process step, timing parameters associated with a process step, and excitation of voltages associated with a process step (fig 1-9, col 1-9), wherein at least one of concentration, rate of flow, and degree of abrasiveness is controlled to correct overlay error (fig 1-9, col 1-9).

(Claim 9) wherein the measurement component and the control component facilitate in situ (fig 1-9 in combination with other processes/hardware/software/steps, insofar the limitation is understood) correction of overlay error.

(Claims 10, 32) the control component facilitating simultaneous overlay correction of two or more wafers (title, abstract, background, summary, col 6-9)

(Claim 11) wherein the overlay target has a structure of at least one of box-in-box, frame-in-frame, segmented frame, and periodic structure (fig 1-10).

(Claims 19, 24) A stand-alone metrology unit (col 1-2, 6-7, 9)

(Claim 20) the overlay target associated with a particular die on the wafer (fig 1-10).

(Claim 22) the wafer discarded if a threshold percentage of cells exhibit a threshold level of overlay error (fig 1-6).

(Claim 25) correcting overlay error between non-adjacent layers of the wafer based at least in part on the measured overlay error existent in representative layers of the overlay target (abstract, background, summary, col 6-9)

(Claim 27) further comprising approximating overlay error between adjacent layers on a wafer via measuring overlay error between the representative layers of the overlay target (abstract, background, summary, col 6-9)

(Claim 28) further comprising correcting overlay error between adjacent layers of a wafer based at least in part on the measured overlay error existent in representative layers of the overlay target (abstract, background, summary, col 6-9)

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(Claims 29-30) substantially/insubstantially correcting overlay error between non-adjacent layers of the wafer in a first dimension (abstract, background, summary, col 6-9), and substantially/insubstantially correcting overlay error between adjacent layers of the wafer in a second dimension (abstract, background, summary, col 6-9)

***Claim Rejections - 35 USC § 103***

*The following is a quotation of 35 U.S.C. 103(a), which forms the basis for all obviousness rejections, set forth in this Office action:*

*(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.*

3. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (USP 6218200) and/or Knutrud (USP 6612159) in view of one or more of: Gau et al (US patent application publication No. 2003/0087192) and Smith et al (US patent application publication No. 2002/0102482)

Chen and Knutrud disclose substantially all the elements in claim 8 except correction of rotational overlay error.

Gau discloses correction of rotational overlay error in para. 0008 and Smith discloses correction of rotational overlay error in para. 0066

It would have been obvious to one of ordinary skill in the art at the time of the invention to facilitate correction of rotational overlay error simply because one or more of: correction of rotational overlay error is conventional as taught by Gau, and correction of rotational overlay error is the most common as taught by Smith.

4. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (USP 6218200) And/or Knutrud (USP 6612159) in view of one or more of:

Goo (US patent application publication No. 2004/0002172);

Carpi et al (US patent application publication No. 2004/0207097); and

Hattori (USP 6187697)

Chen and Knutrud disclose substantially all the elements in claim 12 except gratings

Goo discloses gratings in para. 0006.

Carpi discloses gratings in para. 0005.

Hattori discloses gratings in col 1

It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize gratings simply because gratings are conventional as taught by Goo, Carpi, and Hattori.

5. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (USP 6218200) And/or Knutrud (USP 6612159) in view of one or more of:

Fay et al (US patent application publication No. 2004/0109165),

Kirchner et al (USP 6028910),

Ausschnitt (USP 6766211)

Chen and Knutrud disclose substantially all the elements in claim 15 except optical microscopy

Fay discloses optical microscopy in para. 0006.

Kirchner discloses optical microscopy in col 2.

Ausschnitt discloses optical microscopy in col 6.

It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize optical microscopy simply because optical microscopy is commonly used as taught by Fay, and conventional as taught by Kirchner and Ausschnitt.

6. Claims 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (USP 6218200) And/or Knutrud (USP 6612159) in view of Hagiwara et al (US patent application publication No. 2002/0041377)

Chen and Knutrud disclose substantially all the elements in claims 16, 18 except scatterometry and Fourier transform infrared scatterometry

Hagiwara disclosed scatterometry and Fourier transform infrared scatterometry in paragraphs 0007, 0201, and 0381.

It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize scatterometry and Fourier transform infrared scatterometry simply because scatterometry and Fourier transform infrared scatterometry are conventional and well known.

7. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (USP 6218200) And/or Knutrud (USP 6612159) in view of one or more of: Monshouwer et al (US patent application publication No. 2002/0080364), Byers et al (US patent application publication No. 2002/0137303)

Chen and Knutrud disclose substantially all the elements in claim 17 except SEM

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Monshouwer discloses SEM in para. 0007

Byers discloses SEM in para. 0058

It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize SEM simply because SEM is conventional as taught by Monshouwer and/or SEM is known in the art as taught by Byers.

***Allowable Subject Matter***

Claims 13-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 13-14 would be allowable because the prior art does not teach or suggest the limitation in claim 13 and claim 14.

**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul Dinh whose telephone number is 571-272-1890. The examiner can normally be reached on Monday to Friday from 8:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Paul Dinh  
Patent Examiner

